

CLAIMS

1. A fuel cell comprising:

a power generation unit provided with a conduit for an oxidant gas containing at least oxygen;

a heat radiation unit connected to said power generation unit so as to radiate heat from said power generation unit;

a gas flow means for causing said oxidant gas to flow in said conduit; and

a cooling means driven independently from said gas flow means so as to cool said heat radiation unit.

2. The fuel cell as set forth in claim 1, wherein said power generation unit comprises:

a joint body including a conductor having ionic conductivity and electrodes opposed to each other with said conductor therebetween; and

separators for clamping said joint body therebetween.

3. The fuel cell as set forth in claim 2, wherein said conductor is a proton conductor.

4. The fuel cell as set forth in claim 2, wherein said separators each have a heat transfer

portion extending from the inside of said separator to said heat radiation unit.

5. The fuel cell as set forth in claim 2, wherein said separators each have a water suction means for sucking and removing water from said conduit.

6. The fuel cell as set forth in claim 2, wherein said power generation unit has a stack structure in which said joint body and said separators are laminated.

7. The fuel cell as set forth in claim 6, wherein said separators each have an in-plane conduit for supplying a fuel into the plane where said separator and said joint body make contact with each other.

8. The fuel cell as set forth in claim 7, wherein said separators each have a supply hole for supplying the fuel into said in-plane conduit, and a discharge hole for discharging the fuel from said in-plane conduit.

9. The fuel cell as set forth in claim 8, wherein between the adjacent separators, said supply holes are connected to each other to form a supply passage for supplying the fuel to said separators, and said discharge holes are connected to each other to form a discharge passage for discharging the fuel from said

separators.

10. The fuel cell as set forth in claim 7, wherein the sectional area of a connection portion where said in-plane conduit is connected to said supply passage is smaller than the sectional area of said in-plane conduit.

11. The fuel cell as set forth in claim 7, wherein the sectional area of a connection portion where said in-plane conduit is connected to said discharge passage is smaller than the sectional area of said in-plane conduit.

12. The fuel cell as set forth in claim 7, wherein the sectional area of a connection portion where said in-plane conduit is connected to said supply passage is smaller than the sectional area of a connection portion where said in-plane conduit is connected to said discharge passage.

13. The fuel cell as set forth in claim 7, further comprising a water discharge means for discharging water from said in-plane conduit by generating a difference in pressure on said water between the supply passage side and the discharge passage side, in said in-plane conduit in which said water is accumulated.

14. The fuel cell as set forth in claim 11, wherein said water discharge means opens a part of said discharge passage to the atmosphere so as to generate said pressure difference and thereby to discharge said water from said in-plane conduit.

15. The fuel cell as set forth in claim 1, wherein said cooling means causes a gas stagnating in the vicinity of at least said heat radiation unit to flow so as to release heat from said heat radiation unit.

16. The fuel cell as set forth in claim 1, further comprising detection means for detecting an environmental condition for controlling the driving of said gas flow means and said cooling means.

17. The fuel cell as set forth in claim 16, wherein said detection means detects temperature and/or humidity as said environmental condition.

18. The fuel cell as set forth in claim 16, wherein said detection means are arranged respectively at such positions as to be able to detect the temperature and humidity of said oxidant gas supplied to said power generation unit, the temperature and humidity of said oxidant gas discharged from said power generation unit, and the temperature of said power generation unit.

19. The fuel cell as set forth in claim 16, further comprising a control substrate supporting thereon a control circuit for controlling the driving of at least said gas flow means and said cooling means on the basis of said environmental condition.

20. The fuel cell as set forth in claim 16, wherein the driving of said gas flow means and said cooling means is controlled according to the amount of water remaining in said power generation unit which is calculated based on said environmental condition and the quantity of electric power generated by said power generation unit.

21. The fuel cell as set forth in claim 1, further comprising a fuel supply means for supplying the fuel for reaction with said oxidant gas from a fuel storage unit to said power generation unit at the time of driving said power generation unit.

22. The fuel cell as set forth in claim 1, further comprising a pressure control means for controlling the pressure of the fuel supplied to said power generation unit.

23. A fuel cell comprising:
a power generation unit provided in its side surface with an opening portion of a conduit for an

oxidant gas containing at least oxygen; and

a heat radiation unit connected to said power generation unit so as to radiate heat from said power generation unit; wherein

a gas flow means for causing said oxidant gas to flow in said conduit is disposed along a side surface of said power generation unit, and

a cooling means for cooling said heat radiation unit is disposed along said side surface adjacently to said gas flow means.

24. The fuel cell as set forth in claim 23, wherein said fuel cell has a casing for covering at least said power generation unit, said heat radiation unit, said gas flow means, and said cooling means.

25. The fuel cell as set forth in claim 23, wherein said gas flow means sucks in said oxidant gas through said opening portion and discharges said oxidant gas through a first exhaust port provided in said casing so as thereby to cause said oxidant gas to flow in said conduit.

26. The fuel cell as set forth in claim 24, wherein said gas flow means sucks said oxidant gas into said fuel cell through a first intake port provided in said casing to thereby form a flow of said oxidant gas

independent of the flow of said oxidant gas generated by said cooling means.

27. The fuel cell as set forth in claim 26, wherein said first intake port is provided at a position opposed to said first exhaust port, and said gas flow means is disposed between said first intake port and said first exhaust port.

28. The fuel cell as set forth in claim 24, wherein said cooling means discharges said oxidant gas through a second exhaust port provided in said casing to thereby cause said oxidant gas to flow in the vicinity of said heat radiation unit.

29. The fuel cell as set forth in claim 24, wherein said cooling means sucks said oxidant gas into said fuel cell through a second intake port provided in said casing.

30. The fuel cell as set forth in claim 29, wherein said second intake port is provided at a position opposed to said second exhaust port, and said cooling means is disposed between said second intake port and said second exhaust port.

31. The fuel cell as set forth in claim 23, wherein said opening portion is tapered so that it becomes narrower along the depth direction of said

conduit for said oxidant gas.

32. The fuel cell as set forth in claim 23, wherein the opening width of said opening portion is greater than the conduit width of said conduit for said oxidant gas.

33. The fuel cell as set forth in claim 32, wherein said opening width is broader than said conduit width along the sideways direction and/or the longitudinal direction.

34. The fuel cell as set forth in claim 23, further comprising detection means for detecting an environmental condition for controlling the driving of said gas flow means and said cooling means.

35. The fuel cell as set forth in claim 34, wherein said detection means detects at least temperature and/or humidity as said environmental condition.

36. The fuel cell as set forth in claim 34, wherein said detection means are arranged respectively at such positions as to be able to detect the temperature and humidity of said oxidant gas supplied to said power generation unit, the temperature and humidity of said oxidant gas discharged from said power generation unit, and the temperature of said power

generation unit.

37. The fuel cell as set forth in claim 34, further comprising a control substrate supporting thereon a control circuit for controlling the driving of at least said gas flow means and said cooling means on the basis of said environmental condition.

38. The fuel cell as set forth in claim 23, wherein a water discharge means for discharging water from said conduit for the fuel supplied to said power generation unit for reaction with said oxidant gas is disposed along an end face of said power generation unit.

39. The fuel cell as set forth in claim 38, wherein a fuel supply means for supplying said fuel from a fuel storage unit to said power generation unit at the time of driving said power generation unit is disposed along an end face of said power generation unit.

40. An electronic apparatus comprising a fuel cell, said fuel cell comprising:

a power generation unit provided with a conduit for an oxidant gas containing at least oxygen;

a heat radiation unit connected to said power generation unit so as to radiate heat from said power generation unit;

a gas flow means for causing said oxidant gas to

flow in said conduit; and

a cooling means driven independently of said gas flow means so as to cool said heat radiation unit; wherein

said electronic apparatus is driven by being supplied with electric power from said fuel cell.

41. An electronic apparatus comprising a fuel cell, said fuel cell comprising:

a power generation unit provided in its side surface with an opening portion of a conduit for an oxidant gas containing at least oxygen; and

a heat radiation unit connected to said power generation unit so as to radiate heat from said power generation unit; wherein

a gas flow means for causing said oxidant gas to flow in said conduit is disposed along a side surface of said power generation unit, and

a cooling means for cooling said heat radiation unit is disposed along said side surface adjacently to said gas flow means, and

said electronic apparatus is driven by being supplied with electric power from said fuel cell.